CHAPTER 2 – ALTERNATIVES

This chapter describes the alternatives considered for the project, identifies the alternatives eliminated from further analysis, presents a summary of the predicted environmental effects of the alternatives, and identifies the Preferred Alternative. In accordance with the Federal Highway Administration's (FHWA) Technical Advisory T 6640.8a, the No-action, Transportation System Management (TSM), Transit, and Build alternatives were considered.

2.1 DEVELOPMENT OF "REASONABLE" AND "OTHER" ALTERNATIVES

A wide range of alternatives was developed and evaluated as part of this study. The initial list of alternatives was not constrained by mode, ability to meet the purpose and need, anticipated impacts, or cost. The objective was to begin with a broad listing of specific and independent actions that could be performed, with combinations of actions also considered. Table 2-1 describes the basic characteristics of each alternative. Each alternative includes the improvements to other area transportation facilities and the transit systems that are included in regional, state, and local approved transportation plans.

Table 2-1. Initial Range of Alternatives.

Alternative		Description
No-action		The No-action Alternative assumes that short-term, minor restoration (safety and maintenance) activities that maintain continued operation of the existing roadway facility would be implemented. The basic characteristic of the No-action Alternative is one travel lane in each direction on State Street.
TSM		The TSM (Transportation System Management) Alternative includes activities that improve traffic flow and provide limited capacity improvement without building new travel lanes. TSM activities include: intersection improvements (turning lanes, signal coordination, and optimization), access management to reduce conflicts, and Transportation Demand Management (TDM) activities to reduce demand, such as employer based efforts (ride-sharing, transit promotion, and staggered or flexible work hours) and community efforts (encouraging walking, biking, and telecommuting).
Transit		The Transit Alternative assumes that public transit system improvements would be implemented. Examination of this alternative included a review of currently proposed transit improvements from the Utah Valley 2030 Long Range Transportation Plan (LRTP). The range of transit improvements investigated included both bus and rail improvements.
Improve Existing Roadways		State Street remains a two-lane roadway and 200/220 South and 700 South are improved to five lanes/three lanes and five lanes, respectively.
On-Corridor	Five-Lane	The Five-Lane Alternative includes improvements to State Street between 200 South and Geneva Road (SR-114) to create a five-lane typical section (two travel lanes in each direction and a two-way left-turn lane) with shoulders, curb and gutter, park strips, and sidewalks consistent with State Street north and south of the project.
	Seven-Lane	The Seven-Lane Alternative includes improvements along State Street between 200 South and Geneva Road (SR-114) to create a seven-lane typical section (three travel lanes in each directions and a two-way left-turn lane) with shoulders, curb and gutter, park strips, and sidewalks.

2.2 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Screening of alternatives was performed in two phases: First and Second Screening. The level of analysis of alternatives in each phase of screening increased as the number of remaining alternatives decreased. Figure 2-1 depicts how the screening of alternatives fits into the alternative development and selection process.

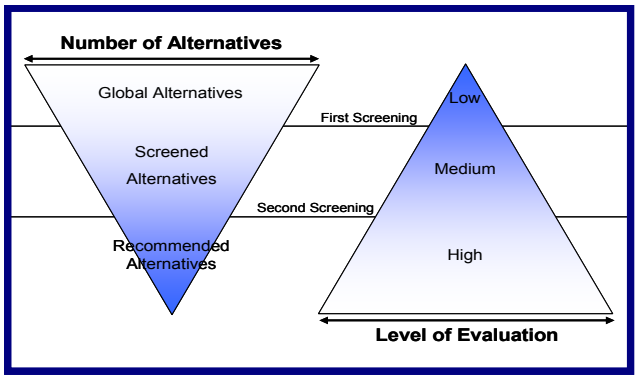


Figure 2-1. Number of Alternatives versus Level of Evaluation.

2.2.1 First Screening

The first alternatives screening process evaluated each alternative's ability to satisfy the purpose and need of accommodating the existing and projected travel demand along State Street, as discussed in Chapter 1. To do so, projected Year 2020 traffic volumes along State Street (i.e., how many vehicles want to use the roadway) were compared to actual capacity (i.e., how many vehicles can use the roadway). The Utah Department of Transportation (UDOT) has determined that for planning purposes a volume over capacity (V/C) ratio of 0.85 is the maximum acceptable V/C for arterial roadways in urban areas. V/C ratios greater than 0.85 result in unacceptable levels of traffic congestion. Alternatives were eliminated from further study when either the V/C would exceed 0.85 or when the capacity provided by the alternative greatly exceeded projected Year 2020 traffic volumes. Table 2-2 shows the capacity of State Street for each alternative at a V/C of 0.85, the projected Year 2020 traffic volumes, the alternatives expected to operate at an acceptable V/C of less than 0.85, and the alternatives advanced to the second screening.

Table 2-2. Comparison Between Projected Year 2020 Traffic Volumes and Capacity for a V/C of 0.85.

Alternative	Capacity for V/C of 0.85 (vpd)	State Street Projected Year 2020 Traffic Volumes (vpd) and V/C		Acceptable V/C (less than 0.85)	Advanced to Second Screening
No-action	17,000	24,500	1.22	NO	YES
TSM	17,000	24,500	1.22	NO	NO
Transit	17,000	24,500	1.22	NO	NO
Improving Existing Roadways: (220 South, 700 South)	17,000	24,500	1.22	NO	NO
Five-Lane	38,250	28,900	0.64	YES	YES
Seven-Lane	49,300	30,800	0.53	YES	NO

Notes: Year 2020 Traffic Volumes differ for each alternative based on the limiting traffic capacity of State Street for each alternative.

A description of each alternative's ability to satisfy the projected Year 2020 traffic volumes, as well as a brief discussion regarding the reasons for elimination of some alternatives, is provided in the following paragraphs. Alternatives eliminated as part of the first screening process included the TSM, Transit, Improve Existing Roadways, and Seven-Lane Alternatives.

No-action Alternative

The No-action Alternative assumes short-term, minor restoration (i.e., safety and maintenance) projects that maintain continued operation of the existing roadway facility would be implemented. The basic characteristic of the No-action Alternative for State Street is one travel lane in each direction.

The No-action Alternative would not provide sufficient capacity for present or projected Year 2020 traffic volumes. At a V/C of 0.85, the capacity of the roadway would be limited to 17,000 vpd. The actual Year 2004 State Street traffic volume was 24,500 vpd and a V/C ratio of 1.22, indicating high levels of congestion and unacceptable operating conditions.

Although the No-action Alternative does not meet the purpose and need of the project, the No-action Alternative is maintained as a baseline comparison to the Preferred Alternative.

TSM Alternative

TSM improvements, such as improved signal timing, signal coordination, and intersection widening, are roadway efficiency-improvement measures that can be controlled and implemented, to a degree, by the agencies with jurisdiction over the roadway (for State Street, UDOT is the jurisdictional agency). TDM programs, such as ride-sharing, staggered or flexible working hours and telecommuting, are tied to promotion and support by major employers. In performing the detailed corridor traffic modeling and capacity analysis for the first screening for this alternative, it was assumed that TSM and TDM improvements would be evaluated separately from each other.

Although beneficial in some locations, TSM and TDM improvements would not provide additional capacity to the two-lane State Street segment, nor would they decrease traffic volumes. The capacity of State Street would still be limited to 17,000 vpd for a V/C of 0.85, and the projected Year 2020 traffic volumes would still be 24,500 vpd (V/C of 1.22), resulting in operations failure of State Street under the TSM Alternative. As for TDM measures, while some larger concentrations of employment do exist to the south of the project area, there are no large employers that, if TDM measures were implemented, would directly affect the State Street travel volume. Further, research has shown that area-wide successful TDM programs can expect to result in four to eight percent reduction in travel demand, but the reduction achieved would only be replaced by other drivers wanting to use State Street. Similar to the No-action Alternative, TSM improvements would not accommodate current and projected Year 2020 traffic volumes. Therefore, the TSM Alternative does not meet the project's purpose and need.

Transit

This alternative would incorporate the transit improvements proposed by the Utah Valley 2030 LRTP. These improvements include the construction of commuter rail from Ogden to Provo and an increase in high-frequency bus routes, including a new State Street route that would run through the project area. Additional improvements to the transit system, both within and outside the project area, would include additional bus turnouts and park and ride lots.

The results of Year 2020 State Street travel demand analysis indicate that transit alone is not capable of providing sufficient system capacity. Although the proposed commuter rail facility

would transport the equivalent of approximately 2,000 vpd of State Street traffic, any reduction in vehicles utilizing State Street would be replaced by other vehicles wanting to use State Street. The same logic holds true for increased high-frequency bus service. An increase in bus ridership of 10% would still result in projected Year 2020 traffic volumes of 24,500 vpd for State Street, which is beyond the capacity of a two-lane road and would result in V/C of 1.22. Therefore, the Transit Alternative does not meet the purpose and need of the project.

Improve Existing Roadways Alternative

The Improve Existing Roadways alternative assumes that all projects in the local and regional transportation plans are implemented. State Street would remain a two-lane roadway between 200 South and Geneva Road and the existing roadways located to the north (200/220 South) and south (700 South) of the project area would be improved to increase capacity sufficiently to meet the Year 2020 traffic volumes in the project area. Figure 2-2 displays the 200/220 South and 700 South existing roadways in relation to the project area.

Figure 2-2. Improve Existing Roadways.

Under this alternative, 200/220 South would be improved from two lanes to five lanes between Pleasant Grove Boulevard and State Street and from two lanes to three lanes[1] between State Street and Main Street. In addition to 200/220 South, 700 South would be improved from two lanes to five lanes between Pleasant Grove Boulevard and State Street. Although Pleasant Grove has indicated these improvements are part of their current Transportation Master Plan, these improvements are not expected to occur until 2030. This alternative would make these improvements now, in lieu of replacing the UTA/UPRR bridge and widening State Street.

Even with improvements to 200/220 South and 700 South, it is expected that the projected Year 2020 traffic volumes on State Street would continue to be 24,500 vpd, since the improved parallel facilities would not be expected to draw a sizeable volume of traffic from State Street. The 700 South corridor is too far out of direction for through-travel, has a higher number of signalized intersections than State Street, and would not provide access to areas surrounding State Street. The 200/220 South corridor mainly services local traffic rather than through-traffic and, therefore, would not contribute to the accommodation of projected Year 2020 traffic

[1] Pleasant Grove has indicated that the next update to their Transportation Master Plan for the city will include 200 South at a maximum of three lanes from State Street to Main Street.

volumes on State Street. In addition, the 200/220 South corridor includes a higher number of intersections than State Street. With no decrease in the traffic demand on State Street expected within the project area, traffic volumes would still be higher than capacity and State Street would continue to operate at unacceptable levels of congestion, with a V/C of 1.22. Therefore, the Improve Existing Roadways Alternative does not meet the purpose and need of the project.

Five-Lane Alternative

Consistent with the short-range plans of UDOT and the Mountainland Association of Governments (MAG) for State Street, this alternative assumes that the two-lane segment of State Street in the project area is improved to five lanes (two travel lanes in each direction and a two-way left-turn lane) to match the existing typical sections of State Street at both ends of the project. As an improved five-lane roadway, State Street would have a capacity of 38,250 with a V/C of 0.85. Projected Year 2020 traffic volumes are expected to be 28,900 vpd and would operate at a V/C of 0.64. Thus the Five-lane Alternative satisfies the project's purpose and need of accommodating travel demand.

Seven-Lane Alternative

As noted in Chapter 1, the Pleasant Grove and MAG long range plans identify the need to widen State Street to three travel lanes with a center turn lane through this part of Utah County. This alternative assumes that the two-lane segment of State Street is improved to seven lanes. As an improved seven-lane roadway, State Street would have a capacity of 49,300 vpd with a V/C of 0.85, which greatly exceeds the projected Year 2020 traffic volume of 30,800 vpd, and a V/C ratio of 0.53. Implementation of the Seven-Lane Alternative on this segment of State Street (200 South to Geneva Road) at this time would not significantly increase State Street's ability to accommodate projected Year 2020 traffic volumes over the Five-Lane Alternative since it is limited by the existing five-lane typical sections to the north and south of the project area. Therefore, it is not prudent that the Seven-Lane Alternative be built at this time.

2.2.2 Second Screening

The second screening process consisted of evaluating preliminary social, economic, and environmental impacts, including the potential for impacts to Section 4(f) properties (public parks and cultural and historic resources). The long range plans were considered in setting design elements for the Five-Lane Alternative because the structures are intended to have a lifespan of 50 years. As noted in Chapter 1, both the Pleasant Grove and MAG long range transportation plans identify a need in the foreseeable future to widen State Street to three travel lanes in each direction, with a center turn lane. Any structures, be it railroad or roadway, that are included as part of a build alternative should therefore be designed so as to be able to facilitate potential future expansion of the roadway in accordance with anticipated future capacity needs, as identified in these long range transportation plans.

A typical section for the Five-Lane Alternative is shown in Figure 2-3**.** The Five-Lane Alternative provides improvements to State Street between 200 South and Geneva Road (SR-114) as follows:

- Widening the corridor to a consistent five-lane section, including four 12-ft travel lanes, a 14-ft two-way left-turn lane, 8-ft shoulders, standard curb and gutter, 11-ft park strips, 6-ft sidewalks, and 5-ft outside barriers (where needed) from 200 South to Geneva Road
- Widening and improving the signalized intersection of State Street and Geneva Road
- Providing sufficient vertical clearance at the UTA/UPRR crossing for underpass traffic
- Improving the storm drain system along the corridor
- Accommodating long range plans by using a 127-ft right-of-way and constructing the structural elements (.i.e., roadway bridge and retaining walls) and sidewalks so as to not preclude the possibility of future expansion of the roadway to seven lanes
- Maintaining railroad operations for both existing and projected uses

Several vertical and horizontal alignment options were evaluated for the Five-Lane Alternative in order to identify an alignment which would avoid and minimize impacts to environmental resources within the project area. Environmental resources in the project area as well as the horizontal and vertical alignment options evaluated as part of the second screening process are discussed in the sections to follow.

Description of Environmental Resources Within The Project Area

Section 4(f) Resources

Section 4(f) resources include publicly owned parks, recreation areas, wildlife and waterfowl refuges, and any eligible historic sites. Section 4(f) resources identified within the project area include Wills Memorial Park, the UTA/UPRR Railroad Bridge, the Union Pacific Railroad and depot foundation, and an historic structure (Burton Adams House) located at 100 Adams Street (see Figure 2-4).


Wills Memorial Park

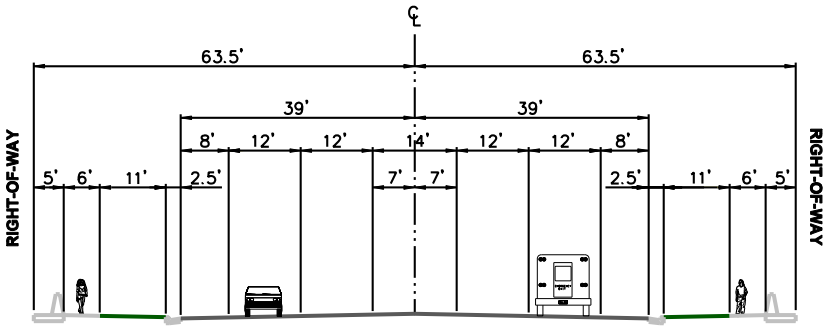

UTA/UPRR Bridge

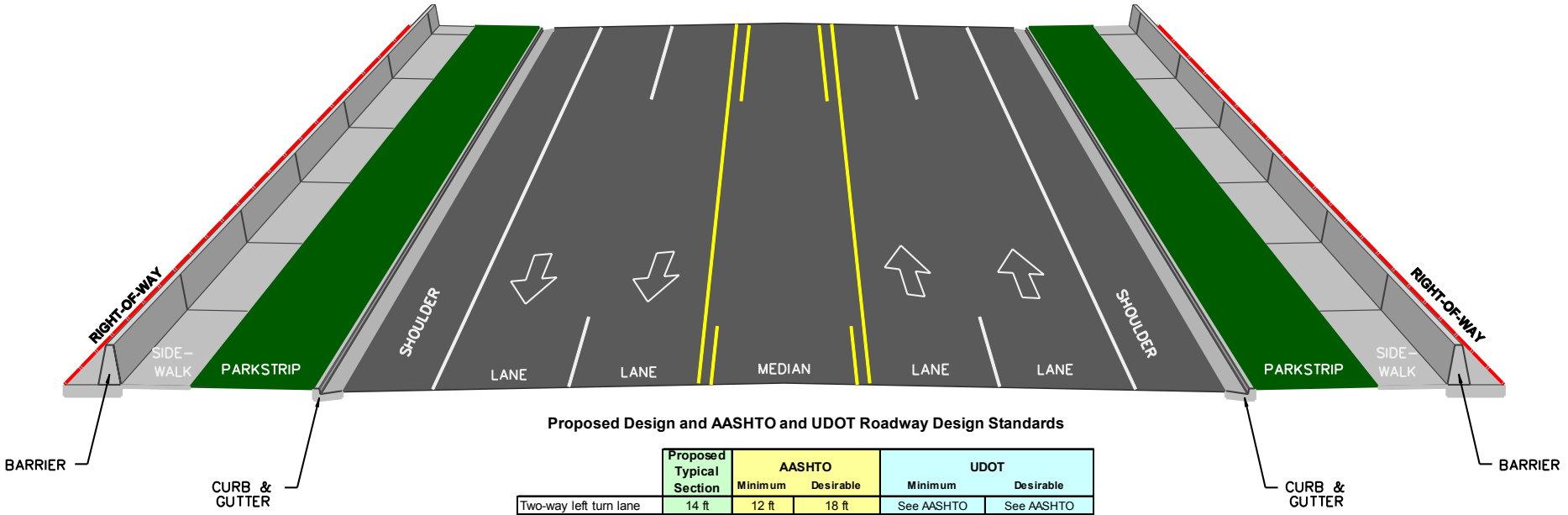

Union Pacific R.R. & Depot Foundation


Burton Adams House Property
100 Adams Street

It is important to note that all vertical and horizontal alignment options equally impact the UTA/UPRR Railroad Bridge, resulting in demolition of the historic structure. This impact is unavoidable, as the width and clearance of the bridge would not accommodate the five-lane configuration necessary to meet the project's purpose and need. Also, all of the vertical and horizontal alignment options would allow continued operation of the railroad by Union Pacific Railroad (UPRR) and the Utah Transit Authority (UTA) during and after construction and all but one vertical alignment (the Road Under Railroad) would not impact the UPRR Depot Foundation.

STATE STREET FIVE-LANE TYPICAL SECTION





Modifications to Typical Section

1. Barrier Is Not Required In Areas Without Retaining Wall Or Structure.
2. Pavement Is Widened an Additional 4' At Intersections To Accomodate Right Turn Lanes.

Proposed Design and AASHTO and UDOT Roadway Design Standards

		Proposed Typical Section	AASHTO Minimum	AASHTO Desirable	UDOT Minimum	UDOT Desirable
Two-way left turn lane		14 ft	12 ft	18 ft	See AASHTO	See AASHTO
Travel Lane		12 ft	10 ft	12 ft	See AASHTO	See AASHTO
Shoulder[1]		8 ft	8 ft	10 ft	See AASHTO	See AASHTO
Bike Lane		0 ft	5 ft	5 ft	See AASHTO	See AASHTO
Curb and Gutter		2.5 ft	1.5 ft	per drainage requirement	2.5 ft	
Border[2]	Parkstrip/buffer strip	11 ft	8 ft	12 ft	0 ft (w/ 6 ft sidewalk) 4 ft (w/ 4 ft sidewalk)	4 ft
	Sidewalk	6 ft			4 ft (w/ 4 ft parkstrip) 6 ft (w/ 0 ft parkstrip)	6 ft (w/ 4 ft parkstrip) 8 ft (w/ 0 ft parkstrip)
	Additional area	5 ft[3]			as needed to achieve clear zone	
Clear Zone[4]		N/A due to use of barriers	20 ft	20-22 ft	20 ft	20-22 ft

Source: AASHTO, *A Policy on Geometric Design of Highways and Streets,* 5th Ed. 2004, UDOT 2005 Standard Drawings

[1] When utilized in urban area, shoulder should meet minimum standard

[2] Border area is a term used by AASHTO to include parkstrip, sidewalk, landscape zones, etc.

[3] Used for roadside barriers and retaining walls

[4] Clear zone represents the area beginning at the edge of outside travel lane and is defined as an unobstructed, relatively flat area beyond the edge of the traveled way that allows a driver to stop safely or regain control of a vehicle that leaves the traveled way.

127-FT RIGHT-OF-WAY FIVE-LANE TYPICAL SECTION

FIGURE 2-3

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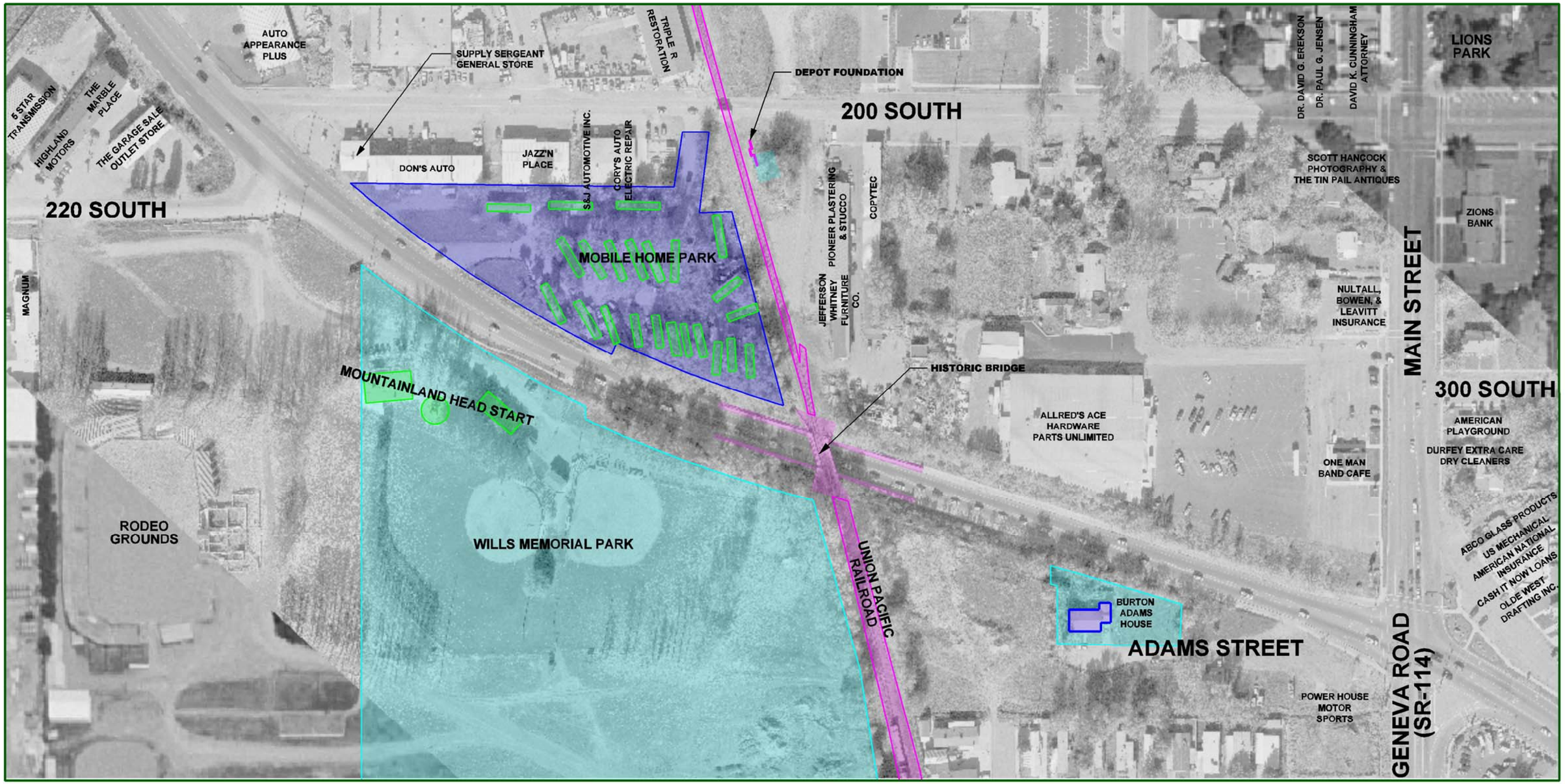


LEGEND:

- ENVIRONMENTAL JUSTICE POPULATIONS
- ENVIRONMENTAL JUSTICE RESIDENCES AND STRUCTURES
- SECTION 4(f) PROPERTY BOUNDARY
- SECTION 4(f) HISTORIC STRUCTURE
- LOCALLY IMPORTANT HISTORIC STRUCTURE

SCALE 1:150

75 0 75 150 300 450 ft

ENVIRONMENTAL RESOURCES WITHIN PROJECT AREA
FIGURE 2-4

O:\2004\0401-011 PG Railroad Bridge\3894_cd\Environmental\EA\Figures\3894_Fig_2-4_Environmental Resources within Project.dgn

01/16/2006

Environmental Justice

Surveys of the social and economic conditions of residents in the mobile home park were performed in March of 2004 and in March of 2005 to identify any low-income or minority populations and to identify potential impacts of the proposed improvements to those individuals. The surveys identified residents within the mobile home park that are eligible for protection under the Environmental Justice Executive Order. The mobile home park population was determined to be 41% Hispanic and 59% Caucasian. Approximately 50% of the mobile home park residences surveyed were low-income households. These percentages are much higher than the community at large. Utah County has only a 7% minority population and 12% low-income households.

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.
Fundamental Environmental Justice principles include the avoidance, minimization, or mitigation of disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.

Economic Resources

There are several businesses located along the corridor (see Figure 2-4). These businesses are as follows: Auto Appearance Plus, Supply Sergeant General Store, Don's Auto, Allred's Ace Hardware, Parts Unlimited, and Power House Motor Sports.

Groundwater and Water Quality

The United States Geological Survey (USGS) evaluated groundwater depths and quality in the early 1980s. These evaluations identified groundwater sources within the project area at an average depth of 20-ft below ground level, with a minimum depth of only 13.5-ft. Groundwater elevations have fluctuated since the USGS evaluations and it is expected that current groundwater levels are approximately 20 to 25-ft below ground level.

Vertical Alignment Options Screening

Three vertical alignments were considered: Road Over Railroad, Road At-grade with Railroad, and Road Under Railroad (see Table 2-3 and Figure 2-7).

Table 2-3. Summary of Vertical Alignment Options.

Vertical Alignment Options	Description
Road Over Railroad	• Roadway crosses over the railroad. • Roadway is raised to a maximum of 43-ft in elevation above existing roadway (currently 18-ft below the railroad) • Railroad is lowered by a maximum of 5-ft
Road At-Grade with Railroad	• Road crosses the railroad at an at-grade crossing. • Roadway is raised to create the at-grade crossing with the railroad. • Railroad bridge is eliminated and an embankment is built along the existing horizontal alignment of the railroad.
Road Under Railroad	• Road remains crossing under the railroad. • Roadway elevation is lowered by a maximum of 5-ft.

A preliminary evaluation was performed for the vertical alignment options that considered environmental resources and purpose and need elements where applicable.

Road Over Railroad

Description

The Road Over Railroad option includes raising the roadway from its current vertical alignment that crosses under the railroad to now cross over the railroad. The new elevation of the roadway would be a maximum of 43-ft above its current position (currently 18-ft below the railroad).

The railroad would be lowered from its current position by a maximum of 5-ft, so that sufficient vertical clearance under the new roadway bridge can be provided to accommodate the height of the trains without having to raise the roadway further. The current roadway underpass would be filled and an embankment of sufficient width to allow for the addition of another future track built in place of the current railroad bridge.

Adjacent Property Impacts

Taking the road over the railroad would require roughly 1-ac of right-of-way for roadway widening from adjacent parcels. Since the road would be raised above existing ground, retaining walls would be required on both the north and south sides of the roadway in order to eliminate slopes that would have a greater impact on adjacent properties. Retaining walls would be utilized to contain the required fill material for the roadway itself. Retaining wall reinforcing straps would need to be placed from the retaining walls inward beneath the roadway to support the retaining walls (see Figure 2-5).

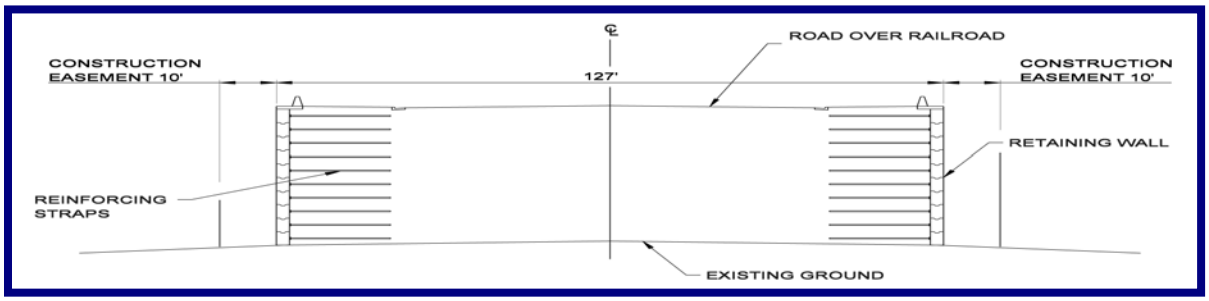


Figure 2-5. Road Over Railroad - Retaining Walls.

Groundwater and Water Quality

Building the road over the railroad would not impact the groundwater resources since it does not require excavation below the groundwater level. Water quality would be expected to increase due to improvements to the storm water drainage system that would be required in order to implement this option. The drainage improvements would reduce contaminants from storm water runoff and would comply with current Utah Department of Environmental Quality (UDEQ) and Utah Department of Water Quality (UDWQ) standards. Further, due to the elevation of the roadway, it is anticipated that the flow rate for the drainage system would be greatly improved.

Safely Accommodate Both Roadway and Railroad Traffic
Due to the grade separation of the roadway from the railroad, no conflicts between roadway and railroad traffic would be encountered. A shoofly would not be necessary during construction since the fill and embankment could be placed without disruption of railroad traffic, except for a minor (i.e., 5 day) shutdown of railroad operations during demolition of the existing bridge.

Road At-grade with Railroad

Description
In the Road At-grade with Railroad option, the road and the railroad would have the same vertical alignment and cross each other at the same grade. This option would require crossing guards and/or signalization at the crossing to ensure the safe operation of both the roadway and the railroad. Under this option, the existing railroad bridge would be removed and fill placed under the roadway to elevate it to the same grade as the railroad.

Adjacent Property Impacts
This option would require roughly 1-ac of right-of-way for roadway widening from adjacent parcels, similar to the Road Over Railroad option.

Groundwater and Water Quality
An at-grade roadway/railroad crossing would not impact groundwater resources since it does not require excavation below the groundwater level. Water quality would be expected to increase due to improvements to the storm water drainage system to comply with current UDEQ and UDWQ standards.

Safely Accommodate Both Roadway and Railroad Traffic
UDOT, UTA, and UPRR have indicated that an at-grade crossing at this location would degrade the overall safety of both the highway and the railroad facilities (see March 17, 2005 UDOT Memorandum, November 17, 2004 letter from UTA, and March 29, 2005 letter from UPRR in Chapter 4). Due to the expected traffic volumes on State Street, the size of the roadway facility, and the existing uses of the railroad track for switching operations, an at-grade crossing would be a hazard, creating conflict potential between trains and vehicles. UDOT, UTA and UPRR have indicated that they do not support an at-grade crossing at this location, due to the inherent safety issues of at-grade highway/railroad crossings with high volume roadway facilities.

Further, an at-grade crossing would not provide a transportation facility consistent with current standards adopted by UDOT, American Association of State Highway and Transportation Officials (AASHTO), UTA and UPRR. Current UDOT policy regarding new at-grade highway/railroad crossings requires the closure or grade separation of two existing at-grade crossings that are similar in use, highway Average Annual Daily Traffic (AADT), and railroad AADT for the creation of each new at-grade crossing (see UDOT Memorandum dated March 17, 2005 in Chapter 4). Utah County does not have two equivalent railroad crossings that could be considered for closure to satisfy this policy requirement.

A shoofly would not be necessary during construction since the fill for the roadway could be placed without disruption of railroad traffic, except for a minor shutdown of railroad operations during demolition of the existing bridge.

Road Under Railroad

Description

With the Road Under Railroad option, the roadway would continue to cross under the railroad, with the roadway being lowered by a maximum of 5-ft in order to provide adequate vertical clearance for the underpass traffic. This would require a new permanent railroad bridge to be constructed, as well as a construction detour or shoofly route, including a temporary bridge, for the railroad during the demolition and construction of the new railroad bridge.

Raising the railroad was initially eliminated from consideration as part of this option due to design constraints that would prevent the railroad from being raised more than 2.5-ft, as well as excessive costs. A change in the vertical alignment of the railroad would include a certain amount of track length north and south of the bridge. The length of railroad track available for a vertical grade change is limited on the north by 200 South and on the south by a connecting spur of the railroad. These limitations restrict the amount of grade change that could exist at the UTA/UPRR bridge, either up or down. The amount the bridge could be raised is limited even more due to the fact that the grade of the railroad south of State Street is steeper and currently at its maximum allowable gradient. Raising the bridge more than 2.5-ft would prevent the track from being able to tie in to the existing spur south of State Street.

Adjacent Property Impacts

Taking the road under the railroad would require retaining walls on both the north and south sides of the roadway, similar to the Road Over Railroad Option. The difference would be that taking the road under the railroad would require a cut section with the soil to be retained that of adjacent properties rather than the roadway itself, as shown in Figure 2-6.

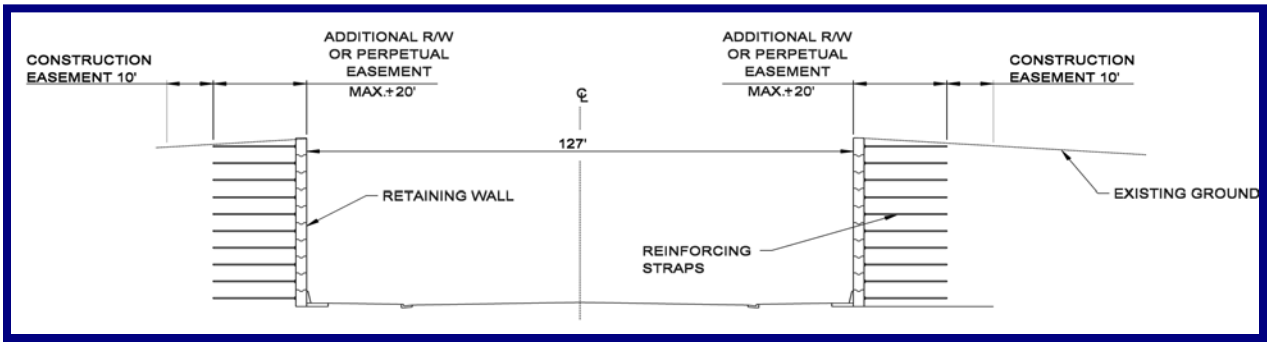
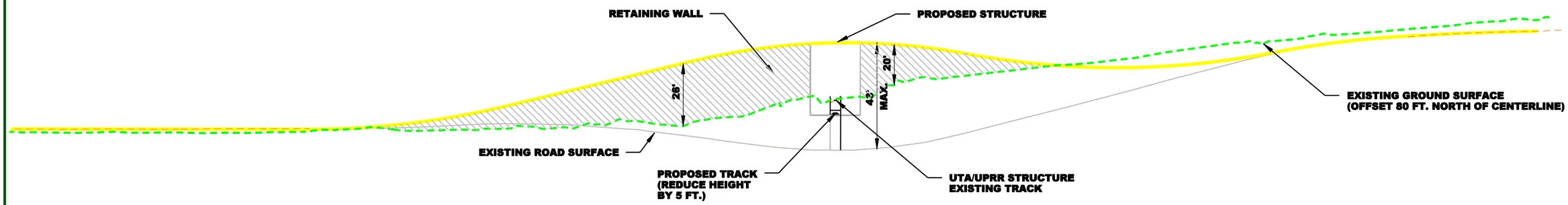


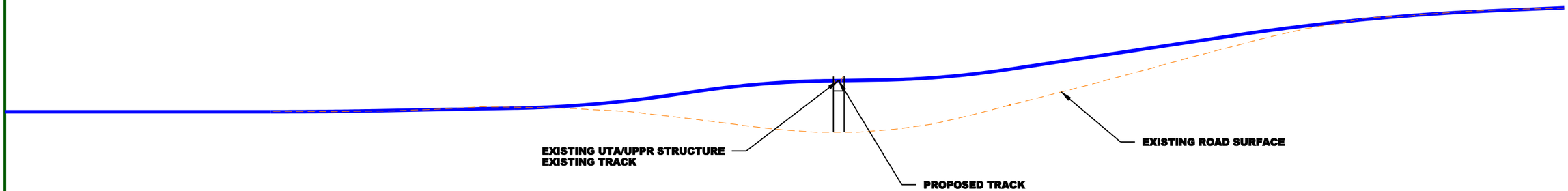
Figure 2-6. Option Road Under Railroad - Retaining Walls.

While the amount of property required for the roadway would be similar to taking the road over the railroad, taking the road under the railroad would require additional property acquisition or perpetual easements beyond the 1-ac required for right-of-way for the protection of the retaining wall reinforcing straps. This additional area would be about 0.8-ac (0.4-ac on each side of the road), a total of 1.8-ac, encroaching from 3-ft to 20-ft into adjacent properties, depending on the wall height. The additional property required for retaining walls would result in additional impacts to adjacent properties. Between the UTA/UPRR crossing and Geneva Road, there would be additional impacts to a Section 4(f) resource (Burton Adams House - south side of the

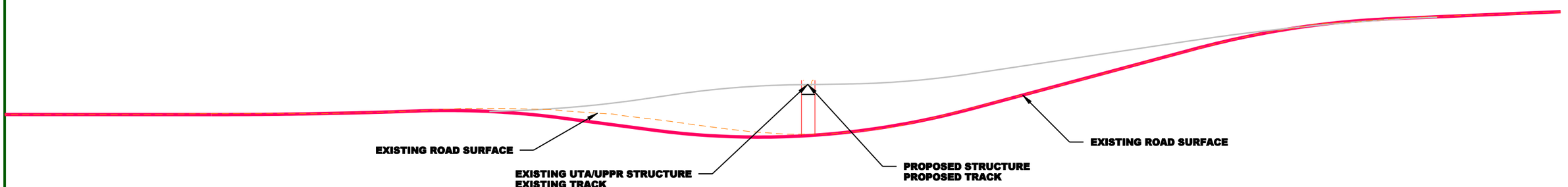
ROAD OVER RAILROAD



ROAD AT-GRADE WITH RAILROAD



ROAD UNDER RAILROAD



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LEGEND:

- Road Over Railroad
- Road At-Grade With Railroad
- Road Under Railroad
- Area of Fill or Retaining Wall

SCALE 1:200

100 0 100 200 400 600 ft

FIVE-LANE VERTICAL
OPTIONS
FIGURE 2-7

roadway), and/or businesses (Allred's Ace Hardware and Parts Unlimited - north side of the roadway). Between 200 South and the UTA/UPRR crossing, the impact would occur to an Environmental Justice population (mobile home park, north side of the roadway), and/or a Section 4(f) resource (Wills Memorial Park, south side of the roadway). The amount and severity of the impact to each resource would depend on whether the horizontal alignment would be shifted to the north or south (see later discussion on horizontal alignment options).

During construction, there would also be further impacts to either the Section 4(f) Depot Foundation on the east or to the Section 4(f) park and the Environmental Justice population in the mobile home park on the west. A shoofly detour route, including a temporary bridge across State Street, would be required to maintain railroad traffic during the demolition of the existing bridge and construction of the new bridge. A shoofly to the east would impact the UPRR Depot Foundation (a Section 4(f) resource), while a shoofly to the west would impact the mobile home park (an Environmental Justice population) and Wills Memorial Park (a Section 4(f) resource).

Groundwater and Water Quality
Building the road under the railroad would require excavation to accommodate current design standards and provide adequate clearance for the UTA/UPRR bridge, bringing the total depth of the roadway to 23 to 25-ft below ground level (5-ft lower than the existing roadway). The extra depth could conflict with groundwater and require the use of draw-down wells and pumping, potentially affecting groundwater quality (e.g., draw down of groundwater would result in an increase in the concentrations of natural sediments and pollutants). In addition, water rights could be affected by reducing the amount of available water through lowering the water table.

Safely Accommodate Both Roadway and Railroad Traffic
Due to the grade separation of the roadway from the railroad, no conflicts between roadway and railroad traffic would be encountered.

Screening Results for Vertical Alignment Options

Road Over Railroad►	Selected for further evaluation because it had the least amount of environmental impacts, costs less than taking the road under the railroad, and had no major safety concerns or conflicts with UDOT policies regarding at-grade railroad crossings.
Road At-Grade►	Removed from further study, due to its inability to satisfy the "consistency with current design standards" element of the purpose and need. This option would require a new at-grade crossing with the UTA/UPRR alignment, which is not consistent with UDOT policies for the introduction of new at-grade highway/railroad crossings. Also, UDOT, UTA, and UPRR indicated that they do not support an at-grade crossing at this location, due to the inherent safety issues of at-grade highway/railroad crossings with high volume roadway facilities.
Road Under Railroad►	Removed from further study due to its comparatively greater impacts to Section 4(f) resources and/or Environmental Justice populations along with its groundwater and water quality impacts.

Horizontal Alignment Option Screening

With the least impacting vertical alignment established as road over the railroad, a preliminary evaluation of environmental impacts was performed for horizontal alignment options. Horizontal alignment selection was challenging in that there are various types of environmental resources within the project area that, due to their locations along the roadway, are in direct conflict with each other. These conflicts include multiple Section 4(f) resources, commercial properties, and an environmental justice population (see Figure 2-4). Between 200 South and the UTA/UPRR crossing, there is a conflict between the mobile home park (environmental justice population), located north of the roadway, and Wills Memorial Park (Section 4(f) resource), located south of the roadway. Between the UTA/UPRR crossing and Geneva Road, the historic Burton Adams House property, a Section 4(f) resource, is located south of the roadway while a large commercial property, Allred's Ace Hardware and Parts Unlimited, is located north of the roadway.

In evaluating horizontal alignment options, it was determined that State Street could be broken into two segments that could be evaluated independently of each other. The eastern segment includes State Street between the UTA/UPRR crossing and Geneva Road. The western segment includes State Street between 200 South and the UTA/UPRR crossing.

Eastern Segment – UTA/UPRR Crossing to Geneva Road

Evaluation of horizontal alignment options for the eastern segment began with the identification of the historic house (Burton Adams House), located on the south side of the roadway. An Intensive Level Survey (ILS) was completed for the Burton Adams House on March 10, 2005 and determined that the structure is eligible for the National Register of Historic Places (NRHP) and is a locally important historic structure for Pleasant Grove. Preliminary coordination with the State Historic Preservation Office (SHPO) determined there would not be an Adverse Effect to the Burton Adams House provided that the roadway fill slope limit was at least 19 feet away from the historic structure (with 15-ft proximity allowed during construction). Further, under Section 6009 of the Safe, Accountable, Flexible, Efficient Transportation Act – A Legacy for Users (SAFETEA-LU), a No Adverse Effect Section 106 determination would meet the criteria for a "de minimis" impact finding, thereby satisfying the requirements of Section 4(f).

To obtain a No Adverse Effect Section 106 determination, the horizontal alignment for the eastern portion of the roadway was developed so that the right-of-way would not encroach within 19-ft of the Burton Adams House. This horizontal alignment allows for the roadway to be constructed within the 127-ft right-of-way without requiring the displacement of Allred's Ace Hardware and Parts Unlimited located on the large commercial property directly north of the historic Burton Adams House (approximately a centerline widening). This alignment therefore

avoids adversely affecting the Section 4(f) property while maintaining the economic viability of the businesses located north of the roadway. Any further shift of the roadway to either the north or south would result in impacts to either the businesses or the historic property.

Western Segment – 200 South to UTA/UPRR Crossing

Horizontal alignment options for the western segment of the roadway are described in Table 2-4 and shown in Figure 2-9**.**

Table 2-4. Summary of Horizontal Alignment Options for Western Segment of Roadway.

Horizontal Alignment Options – Western Segment	Description
Widen to the South	• Widens roadway to the south only
Widen Equally About the Centerline	• Widens roadway equally to the north and south
Widen to the North	• Widens roadway to the north only

Widen to the South (200 South to the UTA/UPRR Crossing)

Section 4(f) Resources: Widening to the south would require property from Wills Memorial Park. Approximately 0.6-ac of park property would be incorporated into the roadway right-of-way. Loss of this property would not impair the activities, function, attributes, or use of the park for its intended purposes. Impacted park facilities would include two barbecue grills and the J.C. Building (used by the Mountainland Head Start School and for other park-related activities). The impacts to the Wills Memorial Park from a south shift horizontal alignment, as well as the proposed mitigation measures, are shown in Figure 2-8.

Mitigation measures would include: constructing a new J.C. Building (used by Mountainland Head Start) in another area of Wills Memorial Park; relocating the barbecue grills closer to the park pavilion; and financial assistance from UDOT to help construct two additional softball fields in conjunction with planned park improvements. With the inclusion of the mitigation measures, Pleasant Grove has agreed that the project would benefit Wills Memorial Park (see letter from Pleasant Grove dated January 5, 2006 in Chapter 4).

Relocations and Social, Economic, and Environmental Justice Issues: Widening to the south would not require the displacement of any residences or businesses. Widening to the south would not require property from the mobile home park and would not impact environmental justice populations.

Widen About the Centerline (200 South to the UTA/UPRR Crossing)

Section 4(f) Resources: Widening about the centerline would require property from Wills Memorial Park. Approximately 0.2-ac of park property would be incorporated into the roadway right-of-way. Loss of this property would not impair the activities, function, attributes, or use of the park for its intended purposes.

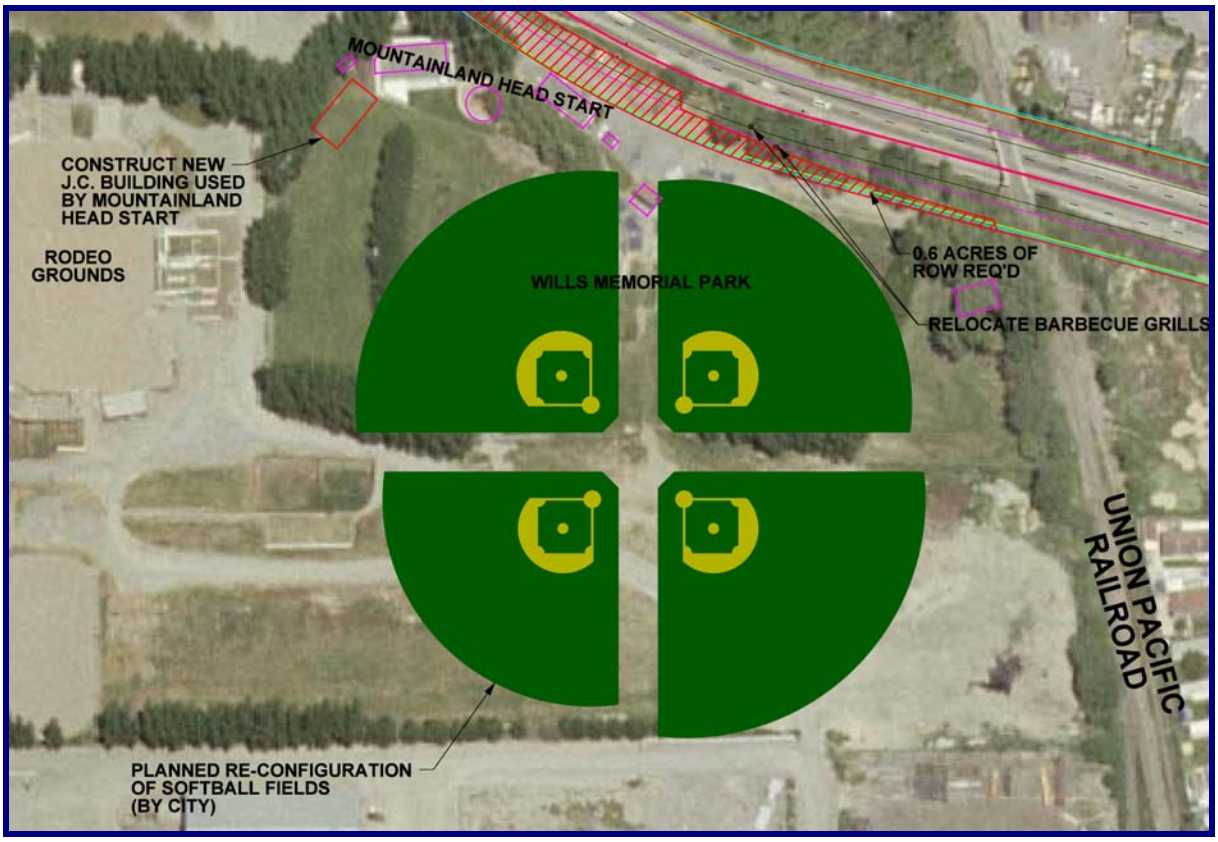

Figure 2-8. Horizontal Alignment South Shift Impacts to Wills Memorial Park (Western Segment)

Relocations and Social, Economic, and Environmental Justice Issues: A centerline widening would have direct impacts to the mobile home park located northeast of the existing UTA/UPRR bridge. UDOT evaluated the economic conditions of the mobile home park and has determined that a loss of any number of mobile homes would economically impact the operation of the entire mobile home park, requiring total buyout and the displacement of 23 residential properties. The displacement of the mobile home park would result in a disproportionately high and adverse impact to low-income and minority populations. Even though these residents would be displaced to decent, safe, and sanitary housing, many residents would likely experience adverse effects of displacement and adaptive difficulties associated with the disruption of their lives, including: adjusting to new neighborhoods, new travel routes, and new shopping areas; changes in proximity to friends and relatives living elsewhere in the city; workplace accessibility; etc. Centerline widening would also require the displacement of one commercial property, the Supply Sergeant General Store, located at the corner of 200 South and State Street.

Widen To The North (200 South to the UTA/UPRR Crossing)

Section 4(f) Resources: Widening to the north would not require property from Wills Memorial Park.

NORTH SHIFT:
RELOCATE SUPPLY SERGEANT
GENERAL STORE AND DON'S AUTO

SUPPLY SERGEANT
GENERAL STORE

CENTER LINE:
RELOCATE SUPPLY SERGEANT
GENERAL STORE AND DON'S AUTO

AUTO
APPEARANCE
PLUS

TRIPLE R
RESTORATION

5 STAR
TRANSMISSION

THE
MARBLE
PLACE

HIGHLAND
MOTORS

THE GARAGE SALE
OUTLET STORE

DON'S AUTO

JAZZ'N
PLACE

S&J AUTOMOTIVE INC.

CORY'S AUTO
ELECTRIC REPAIR

220 SOUTH

MOBILE HOME PARK

DEPOT FOUNDATION

200 SOUTH

NORTH SHIFT:
11 MOBILE HOMES RELOCATED
(WOULD REQUIRE RELOCATION
OF ENTIRE MOBILE HOME PARK)

PIONEER PLASTERING
& STUCCO

COPYTEC

JEFFERSON
WHITNEY
FURNITURE
CO.

CENTER LINE:
11 MOBILE HOMES RELOCATED
(WOULD REQUIRE RELOCATION
OF ENTIRE MOBILE HOME PARK)

DR. DAVID G. EREKSON

DR. PAUL G. JENSEN

DAVID K. CUNNINGHAM
ATTORNEY

LIONS
PARK

SCOTT HANCOCK
PHOTOGRAPHY &
THE TIN PAIL ANTIQUES

ZIONS
BANK

NULTALL,
BOWEN, &
LEAVITT
INSURANCE

MAIN STREET

MAGNUM

MOUNTAINLAND HEAD START

HISTORIC BRIDGE

300 SOUTH

ALLRED'S ACE
HARDWARE
PARTS UNLIMITED

NORTH SHIFT: RELOCATE
ALLRED'S ACE HARDWARE
AND PARTS UNLIMITED

AMERICAN
PLAYGROUND

DURFEY EXTRA CARE
DRY CLEANERS

ONE MAN
BAND CAFE

SOUTH SHIFT:
RELOCATE
MOUNTAINLAND
HEAD START
BUILDING

RODEO
GROUNDS

CENTERLINE:
ROW REQUIRED
FROM PARK

WILLS MEMORIAL PARK

SOUTH SHIFT:
ROW REQUIRED
FROM PARK

UNION PACIFIC
RAILROAD

ABCO GLASS PRODUCTS

US MECHANICAL

AMERICAN NATIONAL
INSURANCE

CASH IT NOW LOANS

OLDE WEST
DRAFTING INC.

BURTON
ADAMS
HOUSE

ADAMS STREET

CENTERLINE: ROW REQUIRED
FROM HISTORIC PROPERTY
AT 100 ADAMS STREET
(NO ADVERSE EFFECT)

SOUTH SHIFT: RELOCATE
HISTORIC STRUCTURE
AT 100 ADAMS STREET
(ADVERSE EFFECT)

POWER HOUSE
MOTOR
SPORTS

GENEVA ROAD
(SR-114)

SOUTH SHIFT:
RELOCATE
POWER HOUSE
MOTOR SPORTS

LEGEND:

- SOUTH SHIFT
- NORTH SHIFT
- CENTER LINE
- ENVIRONMENTAL JUSTICE POPULATIONS
- ENVIRONMENTAL JUSTICE RESIDENCES AND STRUCTURES
- SECTION 4(f) PROPERTY BOUNDARY
- SECTION 4(f) HISTORIC STRUCTURE
- LOCALLY IMPORTANT HISTORIC STRUCTURE

SCALE 1:150

75 0 75 150 300 450 ft

CONCEPTUAL HORIZONTAL
OPTIONS
FIGURE 2-9

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Relocations and Social, Economic, and Environmental Justice Issues: Widening to the north would have similar impacts to the mobile home park as the widen about the centerline option, resulting in disproportionately high and adverse impacts to the environmental justice population located in the mobile home park by requiring the displacement of all of the mobile home park residents, totaling 23 residences (see previous discussion on the Centerline Shift Option). Widening to the north would also require the displacement of two businesses, located at the corner of 200 South and State Street: Supply Sergeant General Store and Don's Auto.

Horizontal Alignment Options Screening Results for the 200 South to the UTA/UPRR Crossing Segment

Widen to the South►	Selected for further evaluation although it would require property from Wills Memorial Park, a Section 4(f) resource, it would not impair the activities, features, or attributes of the park (with the impacts being mitigated as approved by Pleasant Grove) and it would not require any displacement of residences or businesses, including any environmental justice populations.
Widen about the Centerline►	Removed from further study due to the displacement of all the mobile home park residents (resulting in disproportionately high and adverse impacts to the environmental justice population located in the mobile home park) and the displacement of one commercial property (Supply Sergeant General Store).
Widen to the North►	Removed from further study due to the displacement of all the mobile home park residents (resulting in disproportionately high and adverse impacts to the environmental justice population located in the mobile home park) and the displacement of two commercial properties (Supply Sergeant General Store and Don's Auto). This option has the highest number of displacement and the same impact to environmental justice populations as Widening About the Centerline.

2.3 ALTERNATIVES SELECTED FOR DETAILED STUDY

Reasonable alternatives must meet selection criteria, be technically feasible, and be economically feasible. Alternatives selected for detailed study in the remainder of the Environmental Assessment (EA) include the No-action Alternative and the Five-Lane Alternative, which includes the Road Over Railroad vertical alignment option, the Widen to the South horizontal alignment option for the 200 South to the UTA/UPRR Crossing Segment and the Widen about the Centerline horizontal alignment option for the UTA/UPRR Crossing to Geneva Road Segment (see Figures 2-6 and 2-9).

2.3.1 No-action Alternative

The No-action Alternative includes short-term minor restoration (safety and maintenance) activities that maintain continued operation of the existing roadway facility. The basic characteristic of the No-action Alternative is one travel lane in each direction on State Street. The No-action Alternative also considers improvements by others to other roadways within the general project area, per the Utah Valley 2030 LRTP, to enhance mobility in the area. All of these activities, to be performed by others, would be evaluated as part of the National Environmental Policy Act (NEPA) process for those particular projects. General effects associated with the No-action Alternative for State Street are discussed in detail in Chapter 3 - Affected Environment and Environmental Consequences.

The No-action Alternative does not provide for sufficient capacity for existing and projected travel demand, does not improve continuity, and does not include improvements for intermodal facilities. The No-action Alternative fails to meet the purpose and need of the project, but it can be used as a baseline to compare impacts of the Preferred Alternative.

2.3.2 Five-Lane Alternative

The Five-Lane Alternative proposes to widen State Street between 200 South and Geneva Road in Pleasant Grove to a five-lane section and includes the Road Over Railroad option, the Widen to the South option for the 200 South to the UTA/UPRR Crossing Segment, and the Widen about the Centerline option for the UTA/UPRR Crossing to Geneva Road Segment. The elements of the Five-Lane Alternative include:

- Widening the roadway to five lanes[2] (See Figure 2-3)
  - two 12-ft travel lanes in each direction
  - 14-ft two-way left-turn lane
  - 8-ft shoulders
  - 2.5-ft curb and gutter
  - 11-ft park strips
  - 6-ft sidewalks
- Reconstructing the grade separation between the road and railroad to take the road over the railroad
  - Remove existing UTA/UPRR bridge
  - Lower railroad 5-ft
  - Raise road 43-ft from present elevation to create 23.5-ft clearance between road and railroad
  - Construct new roadway bridge over the railroad
  - Realign access to mobile home park
- Horizontal alignment that minimizes impacts to environmental resources
  - Widening roadway to both the north and south (about centerline) between the UTA/UPRR Crossing and Geneva Road
  - Widening to the south between 200 South and the UTA/UPRR Crossing

[2] The typical section provides a transportation facility consistent with state and regional plans (year 2030 plans identify State Street as a seven lane facility). The proposed typical section includes five lane improvements within a 127-ft right-of-way with installation of structural elements (i.e., the roadway, bridge, the retaining walls, sidewalks and outside barriers) so as not to preclude the possibility of future roadway expansion.

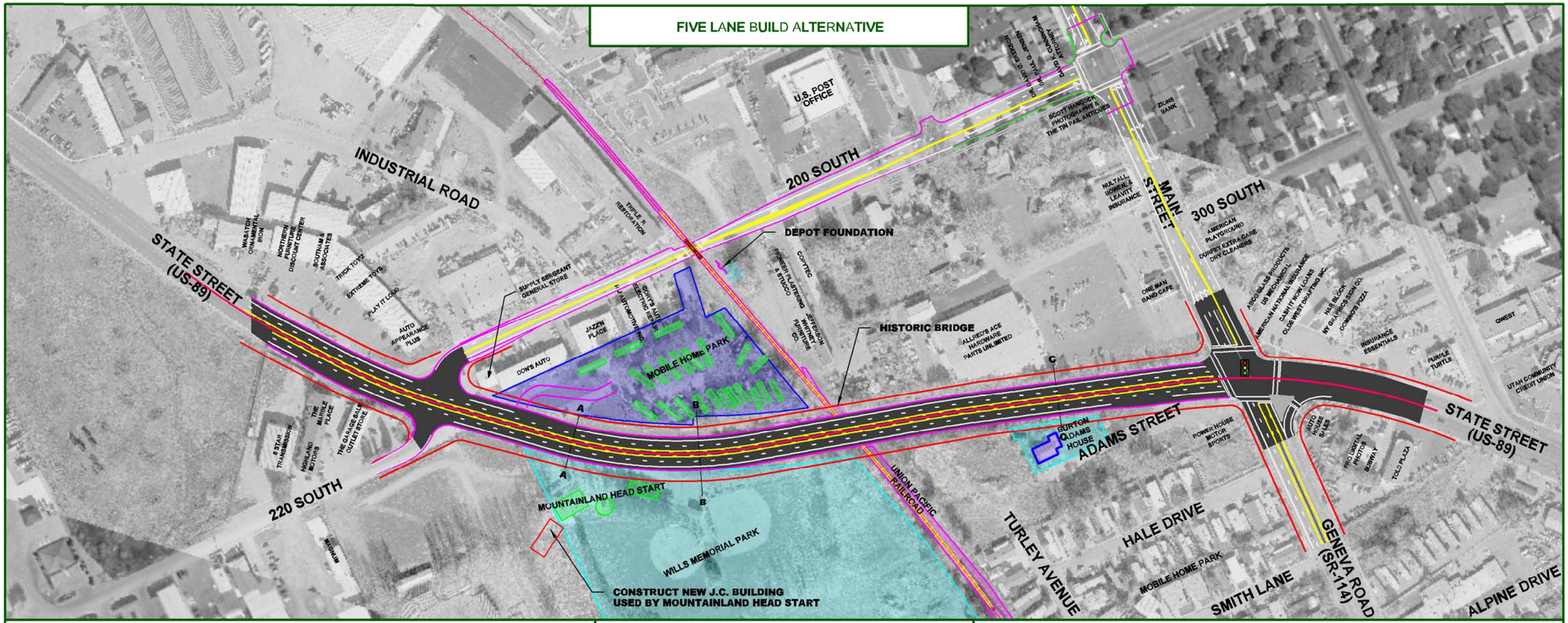
  - Widening and improving the State Street-Geneva Road signalized intersection to provide additional through lanes and longer turning lanes
- Upgrading the storm drain system along the corridor

2.4 IDENTIFICATION OF THE PREFERRED ALTERNATIVE

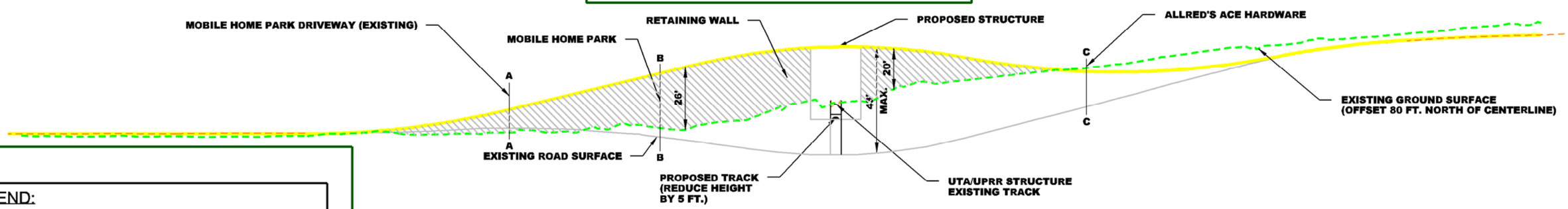
The Preferred Alternative is identified as the Five-Lane Build Alternative and is illustrated in Figure 2-10. It was selected as the Preferred Alternative because it would satisfy the project's purpose and need for increasing traffic capacity sufficiently through the Year 2020; it would provide a transportation facility consistent with current standards, including those adopted by UDOT, AASHTO, UTA, and UPRR; it would not directly impact environmental justice populations; it would have a "de minimis" Section 4(f) impact on the Burton Adams House and would result in a net benefit to Wills Memorial Park; and it would not require the displacement of any residences or businesses. The impacts of the Preferred Alternative are discussed in detail in Chapter 3 – Affected Environment and Environmental Consequences.

Construction of the Preferred Alternative would require the closure of this segment of State Street for about 18 months. It would therefore be necessary to divert State Street traffic during the construction period. A proposed construction detour route would divert eastbound traffic from State Street to 200 South and then south on Main Street until it rejoins State Street (see Figure 2-10). Detour activities would include directional signage and intersection/signal operation control, as well as an asphalt overlay, re-striping, and the addition of a right-turn lane at the intersection of Main Street and 200 South, all of which would occur within the existing roadway right-of-way. The proposed detour route is also evaluated in Chapter 3 for the impacts that would be expected to occur during the construction period along the route.

FIVE LANE BUILD ALTERNATIVE



ROAD OVER RAILROAD



LEGEND:

- RIGHT-OF-WAY LINE
- ENVIRONMENTAL JUSTICE POPULATIONS
- ENVIRONMENTAL JUSTICE RESIDENCES AND STRUCTURES
- SECTION 4(f) PROPERTY BOUNDARY
- SECTION 4(f) HISTORIC STRUCTURE
- LOCALLY IMPORTANT HISTORIC STRUCTURE
- EXISTING TRAFFIC SIGNAL

SCALE 1:200

100 0 100 200 400 600 ft

PREFERRED ALTERNATIVE

FIGURE 2-10

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